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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/705,394	11/10/2003	Warren M. Farnworth	2269-5558H US (99-0253.07	4404

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EXAMINER	
KOSOWSKI, ALEXANDER J	

ART UNIT	PAPER NUMBER
2125	

DATE MAILED: 09/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/705,394	FARNWORTH, WARREN M.	
	Examiner	Art Unit	
	Alexander J. Kosowski	2125	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 June 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-27 and 29-37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-14,23-27,29-37* is/are rejected.

7)☒ Claim(s) *15-22* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1) Claims 1, 3-27, 29-36 and new claim 37 are presented for examination in light of the amendment filed 6/23/06

Allowable Subject Matter

2) Claims 15-22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

3) The following is a statement of reasons for the indication of allowable subject matter:

Referring to claims 15-22, Spence (U.S. Pat 5,123,734), alone or in combination with the prior art of record, does not explicitly teach a method for calibrating a programmable material consolidation apparatus wherein viewing comprises moving a viewpoint from which viewing is effected along a path of a plurality of spaced apart reference pixels, each having a common, known dimension, in combination with the remaining elements or features of the claimed invention.

Claim Rejections - 35 USC § 103

4) The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5) Claims 1, 3-9, 23-27 and 29-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Spence (U.S. Pat 5,123,734), further in view of Suh (U.S. PGPUB 2004/0251242).

Referring to claim 1, Spence teaches a method for calibrating a programmable material consolidation apparatus (Abstract) comprising viewing at least one location substantially at a consolidation elevation of a fabrication site of a programmable material consolidation apparatus (col. 12 lines 28-39 and col. 13 lines 5-21, whereby a calibration plate comprising beam profile sensors is placed at a consolidation elevation of the apparatus); evaluating data obtained from viewing the at least one location and determining an amount of adjustment to be made to at least one component of the programmable material consolidation apparatus, in response to the act of evaluating (col. 13 line 65 through col. 14 line 9, whereby correction factors are created and used to adjust the apparatus). However, Spence does not explicitly teach that viewing is effected from above the consolidation elevation.

Suh teaches a method for controlling a programmable material consolidation apparatus which utilizes a machine vision system to view a feature being fabricated above the consolidation elevation and uses the data to adjust the apparatus (Paragraphs 0056 and 0066-0067 and Figure 5)

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to view from above the consolidation elevation in the invention taught by Spence above since viewing from above the consolidation elevation allows the optical axis of a machine vision system to pass through a region to which a laser beam is irradiated, so dimensions of the object being photographed can be viewed (Suh, Paragraph 0056).

Referring to claim 3, Spence teaches that viewing is effected substantially at the consolidation elevation (col. 12 lines 28-39 and col. 13 lines 5-21, whereby a calibration plate comprising beam profile sensors is placed at a consolidation elevation of the apparatus).

Referring to claim 4, Spence teaches that evaluating comprises comparing the data to at least one expected data value (col. 13 lines 30-44, whereby calibration utilizes predetermined programmable distances and compares them to actual results).

Referring to claim 5, Spence teaches determining comprises determining that no adjustment of the at least one component need be made (col. 13 lines 34-55, whereby adjustments are made only if the expected values are not received).

Referring to claim 6, Spence teaches adjusting the at least one component by the amount of adjustment (col. 14 lines 3-6).

Referring to claim 7, Spence teaches adjusting the at least one element of the programmable material consolidation apparatus by at least a portion of the amount of adjustment (col. 14 lines 3-6).

Referring to claim 8, Spence teaches fabricating at least one feature substantially at the consolidation elevation (col. 4 lines 12-61).

Referring to claim 9, Spence teaches the above. However, Spence does not explicitly teach that viewing comprises viewing the feature being fabricated.

Suh teaches a method for controlling a programmable material consolidation apparatus which utilizes a machine vision system to view a feature being fabricated above the consolidation elevation and uses the data to adjust the apparatus (Paragraphs 0056 and 0066-0067 and Figure 5)

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to view a feature being fabricated in the invention taught by Spence above since

viewing a feature being fabricated allows process parameters to be controlled to reach target values (Suh, Paragraph 0023).

Referring to claim 23, Spence teaches directing selectively consolidating energy toward a plurality of locations of the consolidating elevation (col. 12 lines 1-65, whereby a laser is moved between multiple locations on a calibration plate).

Referring to claim 24, Spence teaches that directing includes directing the selectively consolidating energy toward at least one location proximate a corner or an edge of a rectangular field of exposure at the consolidating elevation (col. 12 lines 13-39 and col. 13 lines 30-46 and Figure 16a, whereby the calibration plate is square and the sides are found).

Referring to claim 25, Spence teaches at least some of the plurality of locations are in substantially linear alignment (Figure 16a).

Referring to claim 26, Spence teaches that viewing comprises viewing actual locations of the consolidating elevation to which the selectively consolidating energy is directed (col. 12 lines 28-39 and col. 13 lines 5-21, whereby a calibration plate comprising beam profile sensors is placed at a consolidation elevation of the apparatus).

Referring to claim 27, Spence teaches placing at least one light sensitive element substantially at the consolidating elevation, the viewing being effected with the at least one light sensitive element (col. 12 lines 28-38, whereby photodiodes are utilized).

Referring to claim 29, Spence teaches that evaluating data comprises comparing the actual locations to anticipated locations of the consolidating elevation where selectively consolidating energy was expected to be directed (col. 13 lines 30-44, whereby calibration utilizes predetermined programmable distances and compares them to actual results).

Referring to claim 30, Spence teaches adjusting a material consolidation element of the apparatus by at least a portion of the adjustment amount to increase a linearity of a path of consolidating energy generated by the material consolidation element (col. 13 line 65 through col. 14 line 9, whereby correction factors are created and used to adjust the apparatus).

Referring to claim 31, Spence teaches a calibration system for use with a programmable material consolidation apparatus (Abstract) comprising at least one imaging element (col. 12 lines 28-39 and col. 13 lines 5-21, whereby a calibration plate comprising beam profile sensors is utilized); and a controller in communication with the at least one imaging element and programmable to effect at least one calibration program that facilitates adjustment of at least one feature of the programmable material consolidation apparatus to calibrate the same (col. 5 lines 17-27 and col. 13 line 65 through col. 14 line 9, whereby correction factors are created and used to calibrate the apparatus, and whereby the calibration is performed with the use of a computer acting as a controller in communication with the apparatus). However, Spence does not explicitly teach that the imaging element is configured to be positioned above the consolidation elevation of the programmable material consolidation apparatus.

Suh teaches a method for controlling a programmable material consolidation apparatus which utilizes a machine vision system to view a feature being fabricated above the consolidation elevation and uses the data to adjust the apparatus (Paragraphs 0056 and 0066-0067 and Figure 5)

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to view from above the consolidation elevation in the invention taught by Spence above since viewing from above the consolidation elevation allows the optical axis of a machine

vision system to pass through a region to which a laser beam is irradiated, so dimensions of the object being photographed can be viewed (Suh, Paragraph 0056).

Referring to claim 32, Spence teaches that the at least one imaging element comprises a machine vision system associated with the programmable material consolidation apparatus (col. 12 lines 13-38 and col. 13 lines 1-55).

Referring to claim 33, Spence teaches that the at least one imaging element comprises at least one light sensitive element configured to be positioned at a location of the programmable material consolidation apparatus at which material consolidation is to occur (col. 12 lines 28-39 and col. 13 lines 5-21, whereby a calibration plate comprising beam profile sensors is placed at a consolidation elevation of the apparatus).

Referring to claim 34, Spence teaches that a light sensitive element is positioned at corners or edges of a field of exposure of the programmable material consolidation apparatus (col. 12 lines 13-39 and col. 13 lines 30-46 and Figure 16a, whereby the calibration plate is square and the sides are found).

Referring to claim 35, Spence teaches a plurality of light sensitive elements (col. 12 lines 28-39).

Referring to claim 36, Spence teaches that a calibration plate including reference features thereon, the calibration plate being configured for placement at a location of the programmable material consolidation apparatus at which material consolidation is to occur (col. 12 lines 13-27 and col. 13 lines 5-15).

6) Claims 10-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Spence, further in view of Suh, further in view of Philippi (U.S. Pat 6,483,596)

Referring to claims 10-14, Spence and Suh teach the above. However, they do not explicitly teach that fabricating includes fabricating a plurality of reference pixels substantially at the consolidation elevation, that evaluating data comprises comparing actual locations of the plurality of reference pixels to anticipated locations for the plurality of reference pixels, nor adjusting reference grid data or that apparatus by at least a portion of the amount of adjustment.

Philippi teaches a material consolidation apparatus whereby reference pixels are created and compared to a reference grid and whereby the system is adjusted by the amount of adjustment required (col. 4 line 58 through col. 5 line 42).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to compare actual locations with anticipated locations of reference pixels and use the data to adjust the system in the method taught above since this would allow a conformity between a radiation coordinate system and a machine coordinate system to be obtained and used to calibrate the system in an absolute manner (Philipp, col. 5 lines 37-42).

7) Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Spence, further in view of Suh, further in view of Pryor (U.S. Pat 5,871,391).

Referring to claim 37, Spence and Suh teach the above. However, they do not explicitly teach that an imaging element is moved to a plurality of locations above the consolidation elevation by at least one actuator.

Pryor teaches an actuator-controller camera platform that is moved towards and away from a workpiece for inspection and measurement purposes (col. 25 lines 6-11).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize an actuator to move an imaging element in the invention taught above since this would allow a camera based sensor to be moved away from contamination and out of the way of other machine movements (Pryor, col. 25 lines 8-11).

Response to Arguments

8) Applicant argues that with regard to claims 1 and 31, Spence alone does not teach that an imaging element views a location of a consolidation elevation from a location above the consolidation elevation. In response, examiner notes the new rejection above, necessitated by amendment, in which Spence is now combined with Suh in a 35 U.S.C. 103(a) rejection for claims 1 and 31. Therefore, applicants arguments directed towards Spence alone are rendered moot.

Applicant argues with reference to claim 32 that the imaging element of Spence does not comprise a machine vision system, and is only a "simple photodiode array". In response, examiner notes that a computer controlled photodiode array, such as that taught by Spence, is broadly considered to be a machine vision system in that it is a machine system which can detect visual elements.

With regard to claim 9, Applicant argues that "neither Spence nor Suh teaches or suggests a process in which calibration of a programmable material consolidation apparatus may be effected by viewing a consolidation elevation of the programmable material consolidation

apparatus from above, or that data obtained by viewing from such a location may be evaluated and used in such a way as to determine an mount of adjustment to be made to at least one component of the programmable material consolidation apparatus". In response, examiner notes that Suh clearly teaches that process parameters need to be controlled while monitoring a consolidation location (Suh, Paragraphs 0014 and 0076). In addition, Suh teaches that a machine vision system can be positioned above a consolidation elevation in a programmable material consolidation apparatus and gives a justification to do so with the result that an incline with the optical axis allows a region in which a laser beam is irradiated to be viewed (Such, paragraphs 0056 and 0066-0067). Suh combined with Spence clearly teaches the currently claimed limitations of claim 9, as well as claims 1 and 31, and Suh provides motivation to combine the references.

Applicant also argues with regard to claim 9 that Suh provides no "teaching or suggestion that relates to calibration". In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In this case, Spence is utilized to teach the limitation of calibration, and Suh is utilized to teach viewing a fabrication site from above the consolidation elevation.

Referring to claims 10-11, Applicants argues that there is "no teaching or suggestion...in Philippi...that a fabricated object may be viewed to obtain data for evaluation and use in determining an amount of adjustment to be made to at least one component of a stereolithography system". In response, examiner notes that Philippi teaches mounting a film to

a calibration plate and running a stereolithography system to create marks which are then viewing by a machine vision system to apply corrections to the system (Philippi, col. 4 line 49 through col. 5 line 41). Examiner interprets this as viewing a "fabricated object" for the purposes of "determining an amount of adjustment".

Conclusion

9) **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

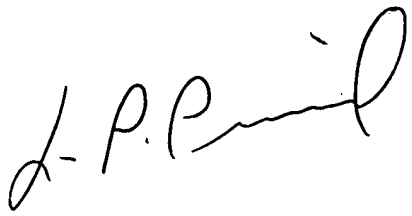
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

10) Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander J Kosowski whose telephone number is 571-272-3744. The examiner can normally be reached on Monday through Friday, alternating Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo Picard can be reached on 571-272-3749. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. In addition, the examiner's RightFAX number is 571-273-3744.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-2100.

Alexander J. Kosowski
Patent Examiner
Art Unit 2125



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